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APPLICATION FOR UNITED STATES LETTERS PATENT

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TITLE:

METHOD OF AND APPARATUS FOR MAKING
ROD-LIKE FILLERS FOR SMOKERS' PRODUCTS

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CROSS-REFERENCE TO RELATED CASES

The present application claims the priority of the commonly owned copending German patent application Serial No. 101 02 266.2 filed January 18, 2001. The disclosures of the aforementioned priority application and of each US and foreign patent and/or patent application identified in the specification of the present application are incorporated herein by reference.

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BACKGROUND OF THE INVENTION

This invention relates to improvements in methods of and apparatus for making cigarettes or other rod-shaped smokers' products wherein a rod-like filler of smokable material is surrounded by a tubular wrapper or envelope of cigarette paper or the like. More particularly, the invention relates to improvements in methods of and in apparatus for making rod-shaped fillers which consist of or contain several types or grades or sizes of smokable material, especially short and long particles of shredded tobacco leaves or the like.

Rod-shaped smokers' products, such as cigarettes, are turned out by so-called cigarette rod makers which produce one or more continuous rod-like fillers. Each filler is draped into a web of cigarette paper or other suitable wrapping material, and the resulting continuous rod is severed by a so-called cutoff to yield a file of discrete cigarettes of unit length or multiple unit length. If the material of which the filler is made contains short and long tobacco particles, the initially obtained mixture of such particles is treated to segregate the short particles from the long particles, the segregated long particles are advanced to a stream forming or building station or zone along a first path, and the segregated short particles are transported to the

stream building zone along a second path. The stream is trimmed or equalized to convert it into a rod-like filler which is then ready to be draped into cigarette paper or the like.

5 As a rule, the stream building zone is designed in such a way that the stream is formed at the underside of the lower reach of an endless foraminous conveyor belt. A suction chamber at the upper side of the lower reach of the belt attracts the short and long particles to the belt.

10 Comminuted tobacco leaves which are to constitute the fillers of cigarettes and the like consist of long and medium long shreds (hereinafter called long particles) and invariably also of short particles or shreds (fragments of long and/or medium long shreds).
15 The development of short particles is unavoidable; such particles are produced during each stage of processing of the long particles and they must be distributed with considerable care because they do not contribute to
20 structural stability of the fillers. In other words, the distribution of long particles must take place with a view to ensure adequate stability of each section of a continuous rod-like filler which is being produced in a cigarette maker, and the distribution of the short particles
25 must be such that they cannot adversely affect

the stability of the filler but merely add to the quantity of smokable material. It is customary to seek a uniform or substantially uniform distribution of short particles in the filler.

5 German patent No. 12 41 744 proposes to fractionate a mixture of fragments of tobacco ribs, short, medium long and long tobacco particles in such a way that an oscillating sieve segregates short and medium long particles from the long particles and from the ribs. The thus segregated short and medium long particles are caused to form a layer, and the long particles and long ribs are distributed on top of the layer. Thus, the resulting twin layer contains all constituents of the original mixture. The next step involves pneumatically lifting the short, medium long and long particles for conversion into a rod-like filler. The fragments of tobacco ribs are too heavy to ascend with the short, medium long and long particles. The thus obtained filler contains a reasonably homogeneous mixture of all three groups of (short, 10 medium long and long) shreds.

Commonly owned German patent No. 34 38 125 A1 proposes to employ a vibratory conveyor with two superimposed bottom walls. The upper bottom wall has openings which are large enough to permit the passage 15 of medium long and short tobacco particles. This upper

bottom wall is further provided with grooves for collection of tobacco ribs. The thus segregated long shreds are removed from the upper bottom wall and are reunited with the segregated medium long and short tobacco particles which were intercepted by the lower bottom wall. The ribs are removed from their grooves and are transported away for further processing. The result of such treatment is the provision of a reasonably homogeneous mixture of short, medium long and long tobacco particles.

Published German patent application No. 15 32 231 proposes to gather short tobacco particles in a container and to monitor the quantity of the thus gathered short particles. The contents of the container are delivered to a suction conveyor for long tobacco particles at a rate which is a function of the quantity of short particles. This proposal, too, leads to a reasonably uniform distribution of short tobacco particles in the flow of long particles.

OBJECTS OF THE INVENTION

An object of the present invention is to provide a method of uniformly distributing short tobacco particles in a mass, flow, stream or an analogous accumulation of long tobacco particles in a manner which is simpler and less expensive but more reliable than heretofore known proposals.

Another object of the invention is to provide a method of making a rod-like filler of tobacco particles which is more homogeneous than heretofore known fillers.

A further object of this invention is to provide a rod-like tobacco filler the structural stability of which exceeds that of heretofore known fillers employing short and long tobacco particles.

An additional object of the instant invention is to provide a method which can be practiced without the development of significant amounts of additional short tobacco particles.

Still another object of the invention is to provide a novel and improved apparatus for the practice of the above outlined method.

A further object of our invention is to provide a novel and improved machine for the making of cigarettes, cigarillos or analogous rod-shaped smokers' products.

An additional object of the invention is to provide a novel and improved distribution of short and long tobacco particles in the fillers of cigarettes, cigars, cigarillos and analogous rod-shaped smokers' products.

5 Another object of the invention is to provide rod-shaped smokers' products wherein the fillers contain short and long tobacco particles in a distribution superior to that proposed in the aforescussed patents.

Still another object of the invention is to provide novel and improved fillers for cigarettes and analogous smokers' products.

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SUMMARY OF THE INVENTION

One feature of the present invention resides in the provision of a method of converting a mixture of short and long tobacco particles into a rod-like filler, e.g., into a filler of the type confined in the tubular wrapper of a plain cigarette. The improved method comprises the steps of segregating the short particles of the mixture from the long particles, advancing an elongated stream of segregated long particles along a predetermined path, and admitting into the path short particles for heterogeneous distribution in the stream.

The method can further comprise the step of gathering segregated short particles into batches or analogous accumulations prior to the admitting step. The admitting step of such method can include introducing into the path a series of spaced apart batches, and such method can further comprise the steps of confining the stream and the batches in a tubular wrapper and severing the wrapper and the stream between successive batches.

The advancing step of such method can include moving lengthwise a stream consisting of long tobacco particles and having two spaced-apart marginal portions, and the admitting step can include applying to one side of the stream batches of short particles in spaced-apart positions from at least one marginal portion.

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The improved method can further comprise the step
of gathering short particles into a mass prior to the
admitting step. The admitting step of such method can
include monitoring the quantity of short particles in
the mass and introducing short particles from the mass
into the stream at a rate which is dependent upon the
quantity of short particles in the mass.

Still further, the improved method can comprise
the steps of gathering short particles into unequal
batches prior to the admitting step and thereupon
equalizing the batches. The admitting step of such
method preferably includes introducing equalized batches
of short particles into the path at at least
substantially identical intervals.

Another feature of the present invention resides
in the provision of an apparatus for building a tobacco
filler for the making of cigarettes or other rod-shaped
smokers' products from a mixture of short and long
tobacco particles. The improved apparatus comprises
means for segregating short particles of the mixture from
the long particles, means for advancing an elongated
stream of segregated long particles along a predetermined
path, and means for admitting into longitudinally spaced-
apart portions of the elongated stream batches of
segregated short particles in a heterogeneous distribu-

tion.

The advancing means can include an endless foraminous conveyor and means for attracting segregated long particles as well as batches of short particles to the conveyor.

The admitting means can include a rotary suction drum having a peripheral array of suction chambers for the delivery of batches of short particles to a predetermined portion of the path. Such apparatus can further comprise means for converting the stream into discrete fillers of rod-shaped smokers' products having a predetermined length. The aforementioned suction chambers are preferably dimensioned in such a way that their length (as seen circumferentially of the drum and hence longitudinally of the path) is less than the predetermined length. The path can have a width which exceeds the width of a batch, and the drum is preferably arranged to deliver batches of short particles at least substantially centrally of the path.

The segregating means can comprise at least one mobile sieve having a mesh such that the sieve permits at least some short particles to pass therethrough but intercepts at least the majority of long particles.

The apparatus can further comprise means for collecting short particles upon segregation from long

particles, and means for monitoring the quantity of short particles in the collecting means.

In a presently preferred embodiment of the improved apparatus, the admitting means comprises a vibratory conveyor which is arranged to transport segregated short particles from the segregating means toward the path for the stream of long particles, and a suction conveyor which is arranged to attract short particles from the vibratory conveyor and to deliver the thus attracted short particles to the path.

The apparatus can also comprise means for collecting short particles upon segregation from the long particles of the mixture, and the admitting means of such apparatus can comprise a conveyor for advancement of short particles to the path as well as means for transferring metered quantities of short particles from the collecting means to such conveyor.

The admitting means can also include means for trimming the batches of short particles prior to their entry into the path for the stream of segregated long particles.

The admitting means can include a first suction conveyor which is rotatable about an at least substantially horizontal axis, and the advancing means can comprise a second suction conveyor which is disposed at a

level above the first suction conveyor and is arranged to accept short particles from the first conveyor.

5 The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved apparatus itself, however, both as to its construction and the modes of assembling and operating the same, together with numerous additional important and advantageous features and attributes thereof, will be
10 best understood upon perusal of the following detailed description of certain presently preferred specific embodiments with reference to the accompanying drawings.

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BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a schematic elevational view of the distributor in a cigarette rod making machine wherein the short and long tobacco particles are manipulated in accordance with one presently preferred embodiment of our invention;

Fig. 2 is an enlarged front elevational view of the part A of the machine as seen from the left-hand side of Fig. 1; and

Fig. 3 is a greatly enlarged view of a detail in the machine of Fig. 1.

DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 illustrates a distributor 1 (also called hopper and hereinafter referred to as hopper) of a cigarette rod making machine. The latter comprises a pneumatic conveyor system 4 serving as a means for advancing an elongated stream (condensed shower 102) of long tobacco particles 99 along a horizontal path defined by the lower reach of stretch of an endless foraminous belt conveyor 86 (see also Figs. 2 and 3). The means for segregating short tobacco particles 78 from the long particles 99 includes a vibratory sieve 27 in the hopper 1, and the means for admitting trimmed or equalized batches 114 of short tobacco particles into the path for the stream (converted shower 102) of long particles 99 includes a rotary suction drum or wheel 82.

The hopper 1 comprises a gate 6 which receives a mixture of randomly distributed (intermixed) short and long tobacco particles 78 and 99 from a suitable source, e.g., from a tobacco shredder, not shown. The gate 6 is mounted at a level above a preliminary distributor 8. A photoelectronic sensor 9 in the distributor 8 transmits a signal when the upper surface of the supply of mixture of short and long tobacco particles 78, 99 descends to a predetermined level, and such signal actuates a motor 21 (e.g., a hydraulic or pneumatic cylinder and

piston unit) which pivots a flap 17 to permit a fresh supply of the mixture to enter the distributor 8. The manner in which the gate 6 can replenish the supply of mixture in the distributor 8 is or can be similar to or identical with that described in US patent No. 4,373,538 granted February 15, 1983 to Wolfgang Steiniger for "METHOD AND APPARATUS FOR FORMING A STREAM FROM SEVERAL TYPES OF TOBACCO".

The lower part of the distributor 8 contains a driven rotary combing roller 10 which propels a flow of mixture along a suitable (e.g., sheet metal) guide 12 and into a primary magazine 14 of the hopper 1. A vibratory conveyor 16 discharges short tobacco particles into the primary magazine 14 and receives such short particles from a trimming or equalizing device 19 (Fig. 2). The arrow 18 denotes in Fig. 2 a stream of surplus tobacco (short particles) which was removed by the trimming device 19 and is on its way into the chute 16 and thence into the magazine 14, i.e., back into the hopper 1.

An endless elevator conveyor 22 has a rising stretch which is adjacent the main magazine 14 and is provided with equidistant platforms or paddles 20 for advancement of successive accumulations of the mixture of long and short tobacco particles onto the top surface of a vibrating and/or otherwise agitated sieve 27. The

primary magazine 14 contains an upper level detector 15a and a lower level detector 15b. These detectors generate signals which initiate movements of the right-hand reach or stretch of the elevator conveyor 22 in the direction indicated in Fig. 1 by the arrow 24. The upper detector 15a can initiate or terminate (when necessary) the admission of the mixture from the distributor 8 (i.e., the operation of the roller 10), and the lower detector 15b can arrest the entire hopper 1 or the entire cigarette maker when it detects that the level of the mixture of short and long tobacco particles has descended below a preselected value. Reference may be had again to US patent No. 4,373,538 to Steiniger.

The deflecting roller or pulley 26 at the upper end of the elevator conveyor 22 causes the latter to discharge successive ascending accumulations of the mixture from the main magazine 14 onto the vibratory sieve 27. This sieve segregates short tobacco particles (78) from the long particles (99) and permits the segregated short particles to enter into a storage facility (container) 29 beneath the sieve 27.

The container 29 also accommodates upper and lower level detectors 31 (such as photocells). Short tobacco particles 78 descend through the sieve 27 and gather in the container 29. Such short particles are evacuated from

the container 29 by a metering unit 70 and are delivered to a vibratory conveyor 76 for short particles by a further conveyor or a further system of conveyors schematically indicated in Fig. 1 by a dotted line 72.

5 The long tobacco particles 99 cannot pass through the vibrating sieve 27 and are caused to advance past a magnet or any other suitable metal detecting and removing unit 28 on their way into an upright duct 32. The latter terminates at a level above a rotary removing conveyor 34 having a carding advancing past a rapidly driven picker roller 40 which propels the longer particles 99 into a downwardly tapering duct 46. The picker roller 40 cooperates with the conveyor 34 to form therewith the shower 102 of long tobacco particles 99 which are advanced toward and against the underside of the lower reach of the foraminous belt conveyor 86.

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20 A nozzle 48 at the lower end of the duct 46 discharges one or more jets of compressed air or another gaseous fluid which propels or propel long tobacco particles 99 through a mouthpiece 62 and against the concave upper side of a guide 54. Ribs and other heavy particles of the flow descending in the duct 32 advance downwardly by gravity beyond the nozzle 48 and are evacuated into a collecting receptacle or conveyor 61 by a cell wheel 56 and a duct 60.

Any short tobacco particles (shown in Fig. 3 at 50) which have descended with tobacco ribs into the range of the cell wheel 56 can rise in a duct 58 to enter the space above the concave guide 54 and to form with the longer particles 99 a stream or flow 51 which is converted into the shower 102 not later than when approaching the underside of the lower reach of the foraminous belt conveyor 86. The mouthpiece 62 of Fig. 1 contains at least one compressed air chamber which discharges compressed air in a direction to the left to thus establish suction in the duct 58 and/or 60 in order to draw short (light) tobacco particles 78 (if any) onto the guide 54 and into the stream of long (heavy) tobacco particles deflected by the nozzle 48 and advancing toward the underside of the lower reach of the endless foraminous belt conveyor 86.

As already mentioned hereinbefore, the short tobacco particles 50 shown in Fig. 3 advance with the heavier and longer particles 99 along the guide 54 and directly to the underside of the lower reach of the endless foraminous belt conveyor 86. The means for advancing longer particles 99 from the sieve 27 (i.e., from the station where the short particles 78 are segregated from the longer particles 99) to the conveyor 86 includes the duct 32, the rotary conveyor 34 and the

picker roller 40, the duct 46, the compressed air nozzle 48 and the guide 54. The means for advancing short particles 78 from the storage container 29 to the vibratory conveyor 76 shown in Figs. 2 and 3 comprises the metering device 70 at the outlet of the container 29; this metering device receives signals from the sensors 31 which monitor the supply of short tobacco particles in the container 29. Such short particles advance from the metering device 70 to the conveyor 76 along the path indicated by the dotted line 72; this path can be established, at least in part, by a slide, a chute, an elevator, a feed screw and/or in any other suitable manner.

The means for supplying metered quantities (hereinafter called batches) 114 of short tobacco particles 78 from the vibratory conveyor 76 to the underside of the lower reach of the conveyor 86 includes the suction wheel or suction drum 82 having an annular array of equidistant peripheral suction chambers or grooves or recesses 80 which communicate with a suitable suction generating device (such as a blower or a suction pump) while advancing with the drum 82 past an arcuate slot 98 in a counterclockwise direction from the approximately 6 o'clock to the approximately 12 o'clock position, as viewed in Fig. 2.

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The drum 82 is installed for rotation in a vertical plane, about a horizontal axis, and at a level below the lower reach of the foraminous conveyor 86. That suction chamber 80 which reaches the 6 o'clock position begins to communicate with the suction generating device (via slot 98) and attracts a quantity of short tobacco particles 78 being supplied by the vibratory conveyor 76. Such quantity of short particles normally exceeds that which should be contained in a finished batch 114; therefore, the drum 82 cooperates with a scraper 106 which removes the surplus from the accumulations confined in successive chambers 80 and returns the removed surplus onto the vibratory conveyor 76 for renewed delivery into the range of the drum 82. The equalized batches 114 advance to the 12 o'clock position of the drum 82, i.e., beyond the suction slot 98, and are attracted to the underside of the lower reach of the foraminous conveyor 86 by the suction chamber 87 of the conveyor assembly 4.

As can be seen in Fig. 3, the horizontal shaft 83 of the drum 82 is mounted in an antifriction bearing 84 which, in turn, is mounted in a housing 81. The shaft 83 can be driven by a suitable prime mover 85, e.g., an electric motor. The aforementioned suction generating device can draw air from successive ascending suction

chambers 80 by way of a conduit 88 which communicates with the slot 98 and delivers air in the direction indicated by arrows 87. The connection between the slot 98 and the suction chamber 80 is established by way of radial channels 92 provided in the drum 82. The character 120 denotes an air admitting conduit which admits atmospheric air into the suction chambers 80 at or close to the lower reach of the belt conveyor 86 (i.e., at the topmost portion of the turret 82) so that successive freshly trimmed or equalized batches 114 are no longer attracted by the suction generating device which draws air from the chambers 80 while they advance past the slot 98, i.e., the conduit 120 permits the suction chamber 87 to attract the batches 114 into the shower 102 of long tobacco particles 99 which advance along the underside of the lower reach of the belt conveyor 86.

The operation of the hopper 1 will be understood upon perusal of the preceding description of Figs. 1 to 3. As far as the making of the batches 114 is concerned, and the distribution of such batches at the underside of the lower reach of the belt 86, the corresponding parts of the cigarette making machine are operated as follows:

The drum 82 is driven by the prime mover 85 in the direction indicated by the arrow 94 (Fig. 2). The vibra-

tory conveyor 76 delivers a continuous flow of short tobacco particles 78 at the rate selected by the metering unit 70. Successive increments of the flow advancing on the conveyor 76 in the direction of arrow 96 are picked up (at 104) by successive suction chambers 80 of the drum 82 and are moved counterclockwise (arrow 94) toward and past the scraper 106 which removes the surplus and thus converts the (remaining) contents of successive suction chambers 80 into discrete batches each having a preselected size and shape. Such finished batches continue to remain in the respective suction chambers 80 during movement at least close to the apex (at 100) of the drum 82. There, the batches 114 enter the shower 102 of long tobacco particles 99 and are attracted by the suction chamber 87 of the conveyor assembly 4, i.e., of the means for advancing the stream or flow of tobacco particles toward the trimming device 19. The air admitting opening 120 is adjacent the apex 100.

The peripheral speed of the drum 82 matches the speed of lengthwise movement of the belt conveyor 86, i.e., the batches 114 which are delivered by successive chambers 80 do not move relative to the stream (converted shower 102) of long tobacco particles 99 advancing toward the trimming device 19.

The batches 114 are shorter than the discrete ciga-

rettes which are obtained upon severing of the continuous cigarette rod having a filler 110 consisting of the converted shower 102 and a file of trimmed batches 114 therein. Furthermore, the suction chambers 80, and hence the trimmed batches 114, are spaced apart from each other, as seen in the circumferential direction of the drum 82 and in the longitudinal direction of the stream building zone at the underside of the lower reach of the belt conveyor 86. Still further, the drum 82 is driven in synchronism with the operation of the cutoff (not shown) which severs the wrapped filler 110 (consisting of a flow of longer particles 99, of the short particles 50 which are admixed to the shower 102, and of equalized batches 114) so that the wrapped filler 110 is severed midway or at least substantially midway between successive trimmed batches 114. As concerns the construction and the mode of operation of a cutoff which can be utilized in a cigarette rod making machine embodying the structure shown in Figs. 1 to 3, reference can be had to commonly owned US patent No. 5,050,471 granted September 24, 1991 to Helmut Niemann for "APPARATUS FOR SUPPORTING AND GUIDING CIGARETTE ROD AND THE LIKE". This patent further shows a wrapping mechanism which can be utilized to drape the tobacco-containing rod-like filler into a web of cigarette paper or the like

upstream of the cutoff.

The cutoff severs the cigarette rod including the filler 110 of Fig. 2 across the body of long tobacco particles 99 between successive pairs of spaced apart equalized batches 114.

The distance between the underside of the lower reach of the foraminous belt 86 and the topmost portion of the drum 82 is or can be selected in such a way that the equalized batches 114 come to rest in the central portion 108 of the trimmed filler 110, i.e., that each batch 114 is completely surrounded by long tobacco particles 99. Furthermore, the dimensions and the positions of the suction chambers 80 can be selected in such a way that the width of a batch 114 at the underside of the lower reach of the belt conveyor 86 is less than the width of the converted shower 102, i.e., that the long tobacco particles in the stream approaching the trimming device 19 extend laterally beyond the batches 114.

The illustrated trimming device 19 is designed in such a way that longitudinally spaced apart portions 112 of the finished rod-like filler 110 contain more tobacco than those between the portions 112. This results in the making of cigarettes having dense ends. The portions 112 are or can be located exactly midway between success-

ive equalized batches 114 of short tobacco 78. Apparatus which can trim a tobacco stream in such a way that the stream is converted into a filler of the type shown at 110 in Fig. 2 of the present application are disclosed in numerous US and foreign patents and applications owned by the assignee of the present application.

In the appended claims, the distribution of batches 114 of short tobacco particles 78 in the converted shower 102 of long tobacco particles 99 will be referred to as a heterogeneous distribution. As utilized in the appended claims, the term "heterogeneous distribution" is intended to denote that selected portions of the filler (110) contain only or predominantly long tobacco particles (99) but that certain other portions of such filler contain batches of short tobacco particles (78) as well as quantities of long tobacco particles. Otherwise stated, the quantity of short tobacco (78) per unit length of the finished smokers' product varies from section to section (as seen longitudinally of such product).

An important advantage of the improved method and apparatus is that they can be utilized for the making of cigarettes or analogous smokers' products wherein the rod-like fillers are much sturdier than in conventionally built smokers' products of such character. This is im-

portant and advantageous because different portions of a cigarette or an analogous smokers' product are often subject to different stresses. It has been ascertained that a substantially heterogeneously distributed group or series or file of short tobacco greatly enhances the stability of the ultimate products. The exact nature of heterogeneous distribution of batches of short tobacco particles in the mass of long tobacco particles depends upon certain circumstances of actual use of the batches 114 and/or of analogous accumulations of particles 78. Metering of short tobacco particles 78 in the suction chambers 80 of the drum 82 by the scraper 106 or the like also contributes to the making of a rod-like filler 110 with a foreseen (predictable) heterogeneous distribution of short tobacco particles in the long tobacco particles and the small quantity (if any) of short particles 50 which together form the shower 102.

Gathering of short tobacco particles 78 into batches 114 and the distribution of such batches in a manner as shown in Fig. 2 render it possible to ensure that the free ends of the fillers of cigarettes or the like do not contain short tobacco particles because the cutoff can sever the cigarette paper surrounding the filler 110 between (rather than across) successive batches 114. The likelihood of escape of short tobacco

particles 78 and/or 50 at the ends of discrete cigarettes is even more remote if the trimming device 19 is designed to provide the filler 110 with projecting portions 112 or the like and if such projecting portions alternate with the batches 114 so that they can be severed subsequent to draping of the filler 110 and during subdivision of the thus obtained cigarette rod, cigarillo rod or the like into discrete rod-shaped smokers' products.

The feature that the batches 114 are implanted in the filler 110 in such a way that they are fully or at least substantially surrounded by long tobacco particles 99 ensures that the stresses to which the filler of a cigarette or the like is subjected are taken up only or almost exclusively by the long tobacco particles 99. Embedding of a file of spaced-apart batches 114 of short tobacco particles in the central portion of the filler 110 has been found to contribute significantly to the stability as well as to other desirable and advantageous characteristics (such as little likelihood that short tobacco would escape at the ends) of the finished smokers' products.

The scraper 106 can constitute a simple tool which simply sweeps away the surplus of short tobacco particles 78 at the radially outer ends of the suction chambers

80, or a more complex (e.g., rotary) trimming or equalizing implement. The removed surplus descends onto the vibratory conveyor 76 and is advanced back into the range of the rotating drum 82 for reintroduction into the oncoming empty suction chambers.

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Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic and specific aspects of the above outlined contribution to the art of making rod-like fillers for cigarettes or the like and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the appended claims.

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